Modeling dependence under censoring and truncation using multivariate mixtures of Erlangs

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We study the estimation and use of multivariate mixtures of Erlangs (MME) to model dependent multivariate censored and truncated data. MME form a *highly flexible* class of distributions as they are dense in the space of positive continuous multivariate distributions. Moreover, the class is *analytically tractable*, has many quantities of interest with a closed-form expression and enjoys interesting closure properties. The use of MME should be regarded as semiparametric density estimation technique to model the dependence directly and hence forms a suitable alternative to copulas. We present an *estimation technique* for fitting MME using the EM algorithm to data that can be *censored and / or truncated*, which is often the case in applications such as loss modeling (finance and actuarial science), clinical experiments (survival / failure time analysis), mastitis studies (veterinary studies), and duration data (econometric studies). We demonstrate the effectiveness of the proposed algorithm and the practical use of MME on simulated data as well as on real data sets.